The Science and Technology: Restoration Opportunities and Obligations, the Montana University System

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Governor's Restoration Conference 2006

Opportunities and Obligations

Restoration and Management

Provide the Next Great Generation of Scientists and Practitioners
The Creative Thinkers
The Doers

Provide Educated and Balanced Citizens, Work Force, Decision Makers

Provide well Trained and Balanced State and Local Staff dealing with Restoration Issues

Grow Montana Restoration-Management Business Statewide, Nationally and Internationally

University System is Well Positioned To Advance Restoration Activities

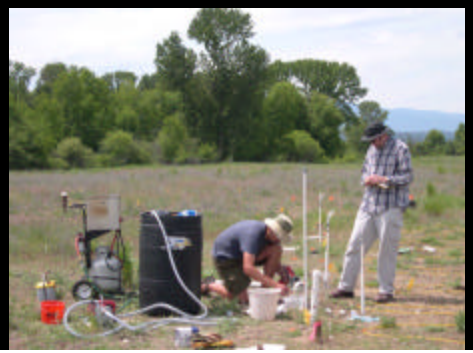
Take Home Points

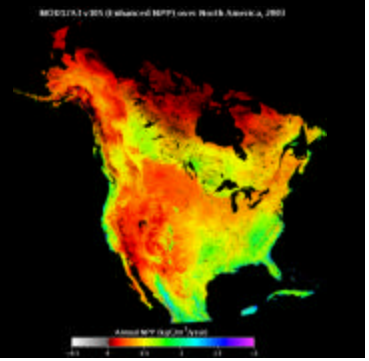
1. **Training - an educated and creative work force, doers and managers.**

2. **Apply modern technology and develop new approaches.**

3. **Restoration is a broad field we already cover a number of aspects.**

4. **Strengthening Montana's position requires targeted investment in the University System .**

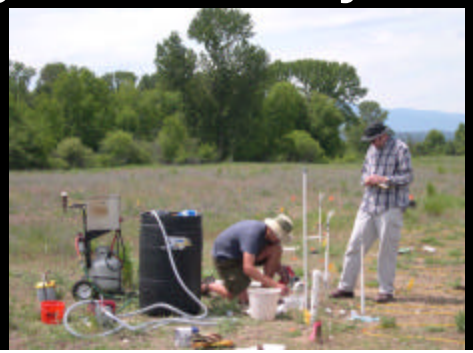



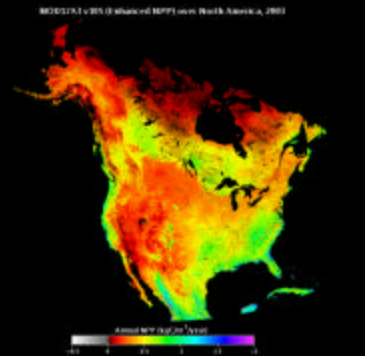


University System is Well Positioned To Advance Restoration Activities

The University of Montana- some examples

1. River Science-Wetlands Stream Restoration
2. Minelands-Water Floodplain Restoration
3. Ground Water Restoration
4.. Wildlife Restoration and management
5. Fire Science-Landscape Restoration and Management
6. Large Scale Ecosystem Enhancement and Restoration



1. What opportunities exist for projects in Montana (and nationwide/international)?

2. What obstacles or risks impede restoration efforts?

3. What policies or actions should the State of Montana implement to seize opportunities?

Wetlands Restoration Needs

INDEPENDENT RECORD

Montana would get $2.1 billion in funds under Senate bill

By CHARLES S. JOHNSON - IR State Bureau - 05/18/05

HELENA — U.S. Sens. Max Baucus and Conrad Burns on Tuesday praised the Senate passage of a $295 billion highway bill that would provide $2.1 billion for Montana over six years.

Opportunity

NO NET LOSS

Obstacles/need

Growth in ability to train a work force and link with large state/federal construction projects

Stream Restoration

US $1 billion/y
MT 10 y $45 million

Montana has over 176,000 miles of rivers
8,900 mi in poor condition
1,300 mi impacted by mining

Opportunity

Improves basic Ecological Health of MT river systems, Develop new Technology

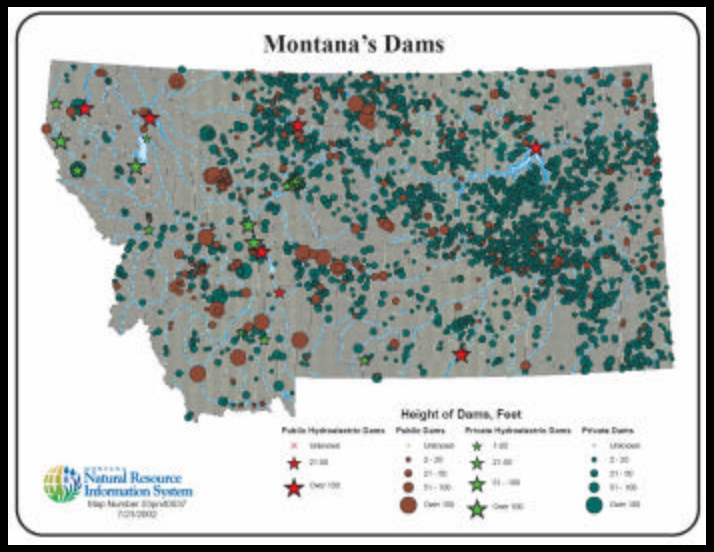
Obstacles/need

Demand is increasing- interdisciplinary training is lagging behind. Opportunity for targeted build up in Universities to meet demand.

Native Fish and Clean Water Act (TMDL) are Restoration Drivers

Silver Bow Creek
$80 million

Dam Removal-Stream Restoration



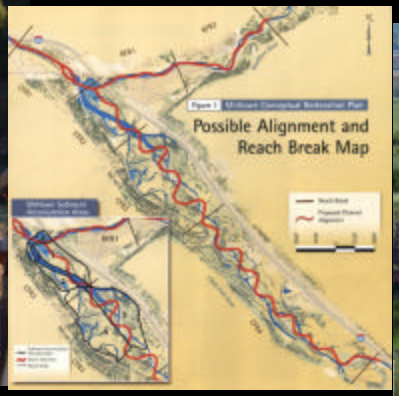
Milltown $123 million

Opportunity

Develop Science of Dam Removal-Environmental Mitigation… Milltown Largest Dam to be remove so far.

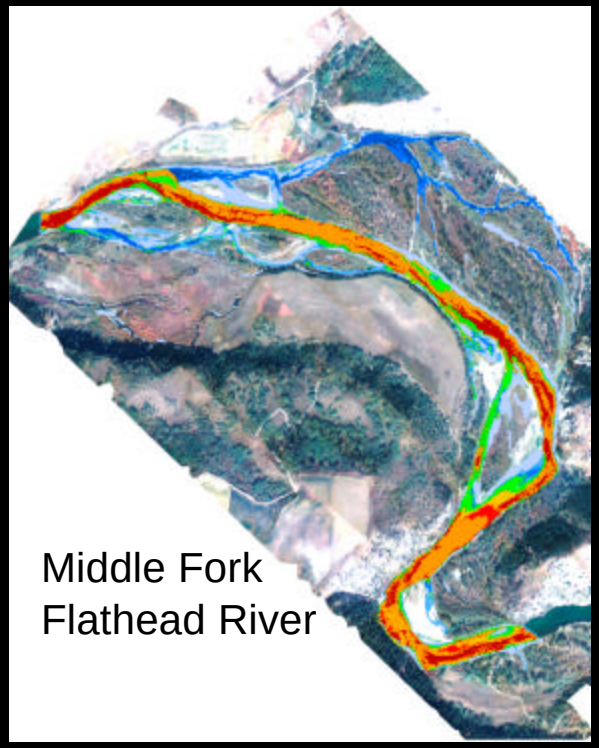
Obstacles/need

Funding during and after analyses, and assessment. (the Science Tech transferability benefits of State Investment in a "leaning" experience).



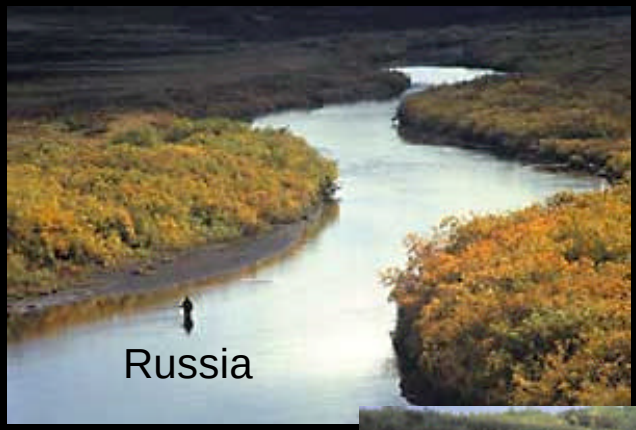
River-Ecological System Restoration Montana Working Around the World

Airborne Hyperspectral Image (1m resolution) with depth and velocity classification



Middle Fork
Flathead River

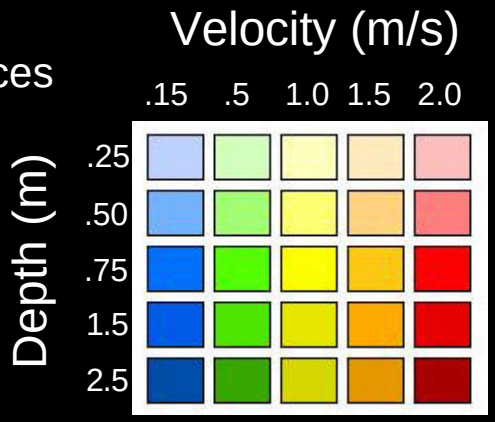
Ecosystem Improvements
Columbia Basin (Umatilla River)



Russia

Geosciences
Biological Sciences
River Center

Flathead Lake Biological Station
The University of Montana



Alaska

September 28 and 29, 2006 Missoula Montana

Assessing Stream Restoration Success: Developing Sustainable Ecological and Physical Systems

Fourth National Conference
www.umt.edu/rivercenter/

Presented by the

Center for Riverine Science and Stream Re-naturalization

The University of Montana Campus

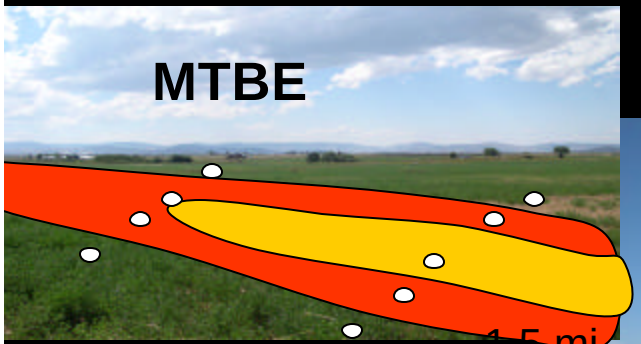
Contamination and GW/SW Restoration

Metals, Arsenic, Fuels, Pathogens, Drugs, Nitrate, Pesticides, Total Dissolved Solids….

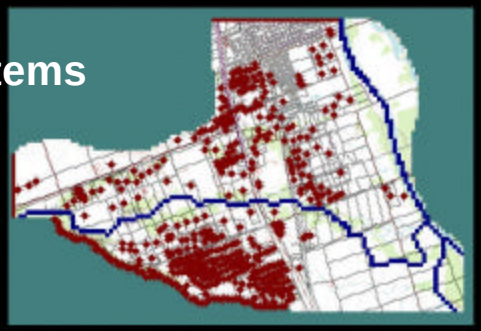
Characterization
Remediation Approaches

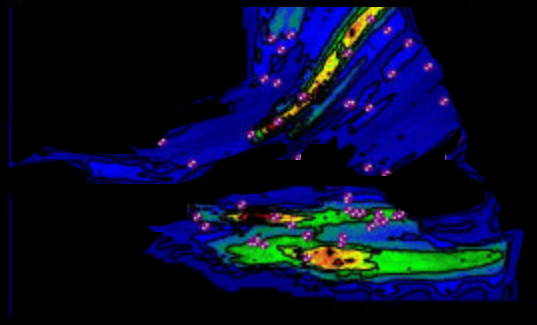
Opportunity
Develop Science, field test
Work with agencies

Obstacles/need
Limited State research or and Coop dollars.



Septic Systems
Nitrate





Wildlife Restoration-Management





Opportunity

Develop Science, field test

Work with agencies.

Attractive Program

Obstacles/need

Limited State research or Coop dollars.

Hunting Revenues- MT $700 million/y

International Assoc. of Fish and Wildlife Agencies

All Visitors

Primary Reason for Trip to Montana	Average Daily Expenditures	Total Expenditures	% of Expenditures
Vacation/Recreation/Pleasure	$110	$742 million	49%
Visit Friends and Relatives	$ 80	$335 million	22%
Business	$ 98	$170 million	11%
Just Passing Through	$ 64	$133 million	9%
Meeting/Convention	$ 92	$ 35 million	2%
Shopping	$159	$ 23 million	2%
Other*/Medical	$ 90	$ 75 million	5%
All Visitors	$ 99	$1.513 billion	100%

McMahon and Cheek, Institute of Tourism and Recreation Research, College of Forestry and Conservation

Forest Land-Fire Restoration
Living at the Forest Edge

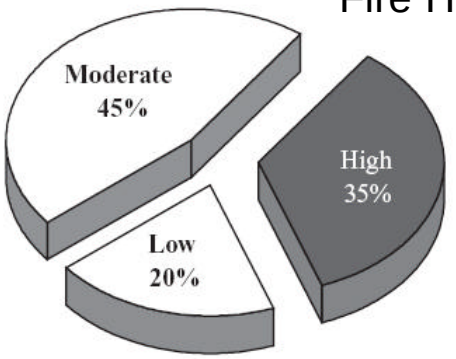
Opportunity

Develop Science, field test, Work with agencies

Obstacles/need

Limited State research or Coop dollars.

Fire Hazard Rating

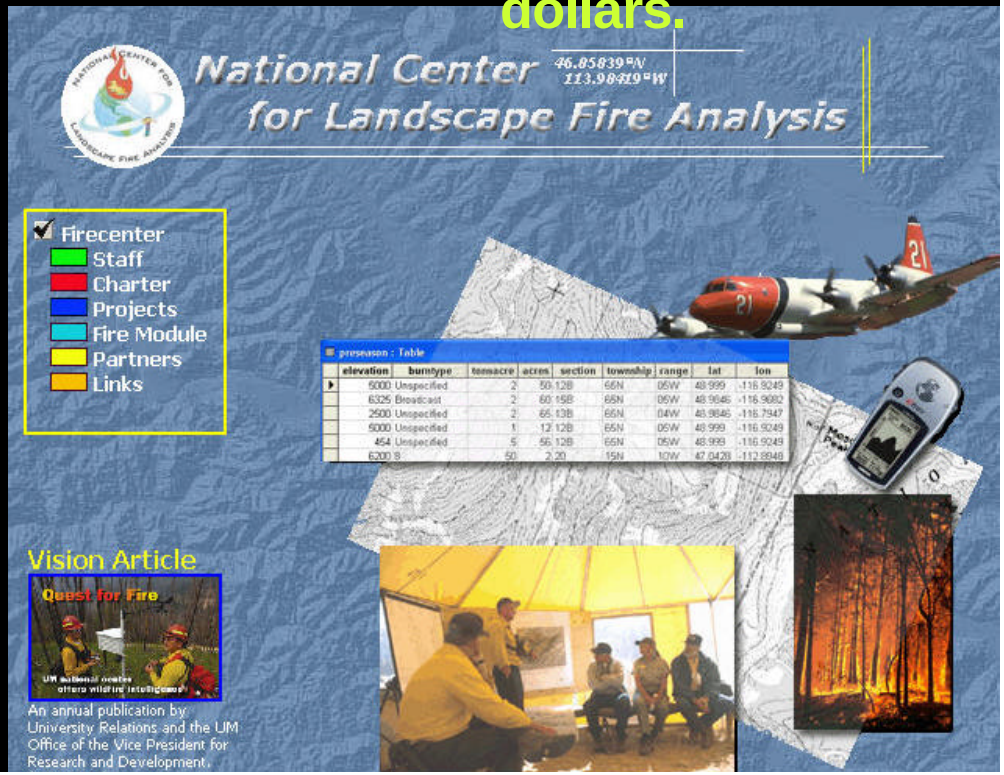


Total acres = 9.3 million

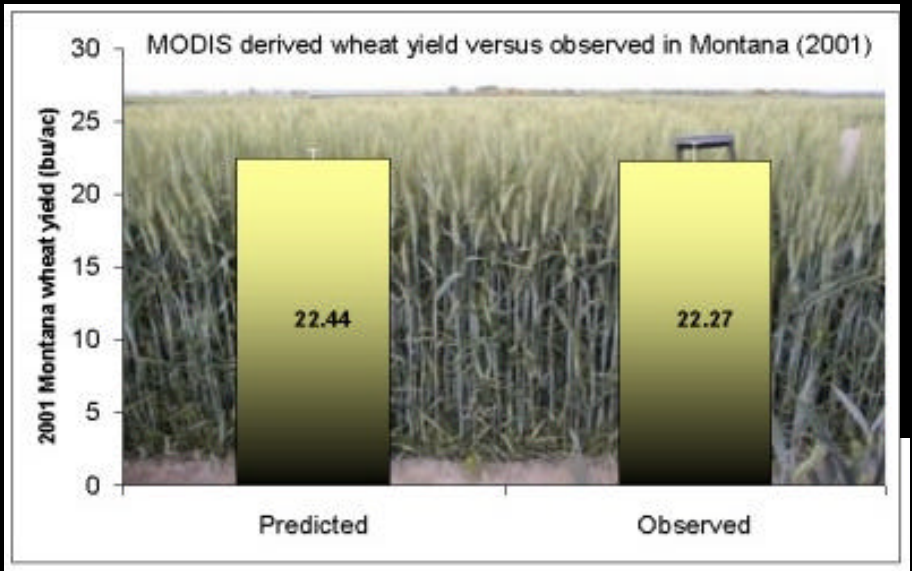
Figure 1. — Proportion of Montana's short-interval fire-adapted forests (PP, DF, DLMC) by fire hazard rating.

700,000 Acres Burned
2000 $107 million
2001 (Reese and Mann, 2003)

Low elevation forests (Keegan et al., 2004)

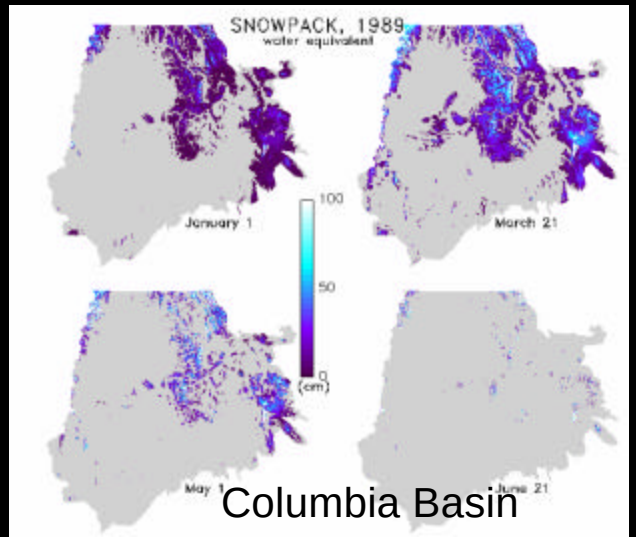


Advance Science -Numerical Terradynamic Simulation Group
Remote Sensing, Ecohydrological Modeling- State to Nation Scale

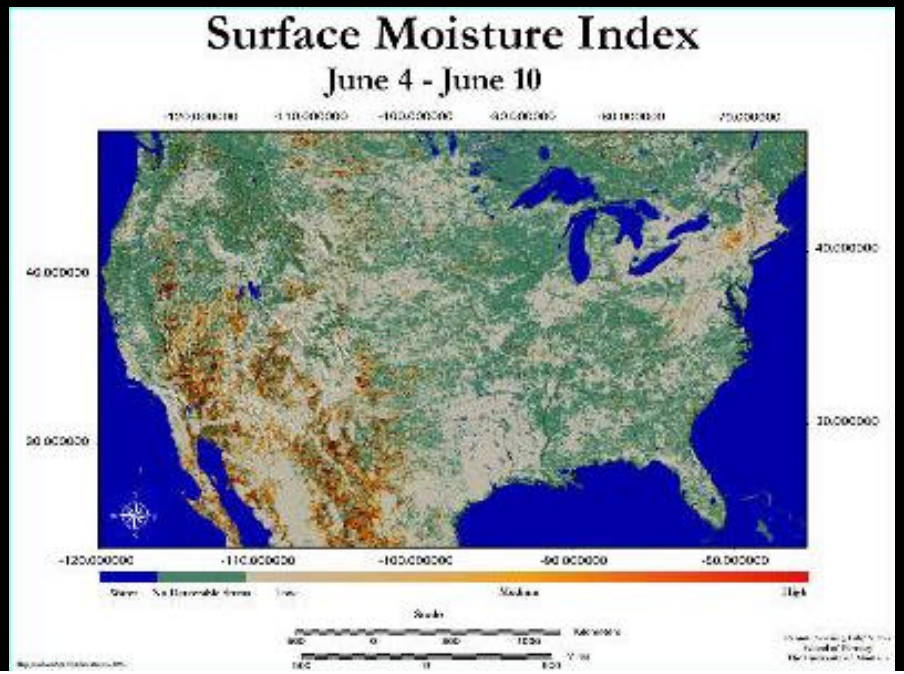


1938 Grinnell Glacier Glacier NP.

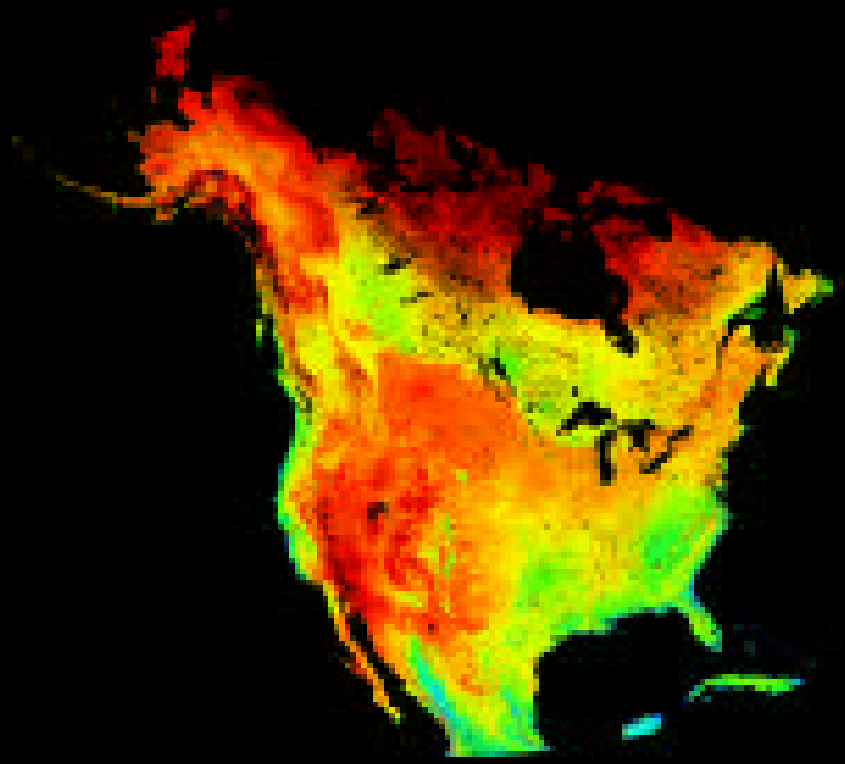
2005 Grinnell Glacier Glacier NP.



Columbia Basin



Global Scale



Net Primary Production

Opportunity

Develop Science, field test International, New Tech.

Obstacles/need

Limited State Investment

Future-reduction of Fed dollars.

Strengths of University System
Science and Technology- Interdisciplinary Teams

College of Forestry and Conservation- New program in Conservation and Restoration, Terradynamic Group- National Center for Landscape Fire Research

College of Arts and Sciences- Geosciences-Chemistry-Division of Biological Sciences-Math-Computer Science

VP Research

Flathead Lake Biological Station

The Center For Riverine Science and Stream Renaturalization

National- Hydrological Observatory Project-

Consortium of Universities for the Advancement of Hydrologic Sciences, Inc

Montana Bureau of Mines and Geology

Department of Geological Engineering, Environmental Engineering, Geophysics UM-Butte

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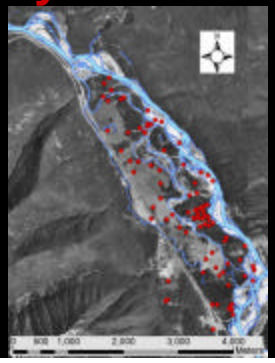
National Science Foundation Biocomplexity Project Middle Fork of the Flathead River



River Ecologists
Microbiologists
Geochemists
Hydrogeologists
Geophysicists
Modelers
Data Managers
GIS
Wetland-Riparian Ecologist
Plant Physiologists
Graduate Students

What Can We Conclude?

We have Extensive Capabilities to Enhance Remediation Activities in Diverse Areas

Seize and Implement to maximize returns:

Grow Science, technology- Target funding to restoration education and training in the Universities, Water, Land, Wildlife…Ecological Systems (Seize the Opportunity).

Invest State Dollars In Targeted Research to expand our Restoration Capabilities.. e.g. Water Center (Position Montana for the Future)

Develop and support coop/intern programs with citizen groups, private industry and State agencies. (Train a work force …experience)

Pay state agency staff a competitive wage to keep institutional memory and a high level of restoration expertise.
(They are the keepers of the States Resources!)